

WHAT IS CLAIMED IS;

1. A mask blank used for the charged particle beam exposure, which is made by employing an SOI substrate having a front-side silicon membrane and a back-side silicon layer with a silicon oxide film interposed therebetween, wherein the back-side silicon layer of said SOI substrate and the silicon oxide film are partially removed to form an opening to be an exposed region and an etching stop layer having lower stress is formed in the opening.

2. A mask blank used for the charged particle beam exposure as claimed in claim 1, wherein said etching stop layer is made of any one selected from a group consisting of Cr, Ti, Ta, Mo, W, and Zr and nitrides, oxides, and oxynitrides of these metals.

3. A mask blank used for the charged particle beam exposure as claimed in claim 1 or 2, wherein a hard mask layer made of any one selected from a group consisting of Cr, Ti, Ta, Mo, W, and Zr and oxides, nitrides, and oxynitrides of these metals is formed on the front-side silicon membrane of said mask blank used for the charged particle beam exposure.

4. A mask blank used for the charged particle beam exposure as claimed in claim 3, wherein said etching stop layer and said hard mask layer are made of the same material.

5. A method of forming a mask blank used for the charged particle beam exposure by employing an SOI substrate having a front-side silicon membrane and a back-side silicon layer with a silicon oxide film interposed therebetween,

comprising:

a step of partially removing the back-side silicon layer so as to form an opening as an exposed region of said SOI substrate;

5 a step of partially removing the silicon oxide film at the portion exposed to the opening; and

a step of forming an etching stop layer in the opening.

6. A method of forming a mask blank used for the charged particle beam exposure as claimed in claim 5, further
10 comprising a step of forming a hard mask layer on the front-side silicon membrane of said SOI substrate.

7. A method of forming a mask used for the charged particle beam exposure made by employing an SOI substrate having a front-side silicon membrane and a back-side silicon
15 layer with a silicon oxide film interposed therebetween, comprising, sequentially,

a step of partially removing the back-side silicon layer of said SOI substrate so as to form an opening as an exposed region;

20 a step of partially removing the silicon oxide film at the portion exposed to the opening;

a step of forming an etching stop layer in the opening;

a step of etching the front-side silicon membrane of said SOI substrate according to a pattern so as to form a
25 mask pattern; and

a step of removing said etching stop layer.

8. A method of forming a mask used for the charged particle beam exposure as claimed in claim 7, wherein said

step of etching the front-side silicon membrane of said SOI substrate including:

5 a step of forming a hard mask layer on said silicon membrane, etching said hard mask layer according to the pattern, and etching said silicon membrane according to the pattern so as to form the mask pattern; and

a step of removing the patterned hard mask layer after the fabrication of said mask pattern.

10 9. A method of forming a mask used for the charged particle beam exposure as claimed in claim 8, wherein said etching stop layer and said patterned hard mask layer are removed at the same time.